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## PATENT SPECIFICATION



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479,455

Application Date (In United Kingdom): Aug. 6, 1936. No. 21677/36.

Complete Specification Accepted: Feb. 7, 1938.

### COMPLETE SPECIFICATION

#### Improvements in or relating to Suction Cleaners

We, THE HOOVER HOLDING COMPANY LIMITED, formerly known as HOOVER LIMITED, a Company registered under the Laws of Great Britain, of Perivale, 5 Greenford, in the County of Middlesex (Assignees of STANLEY ROBINSON CUMMINGS, Citizen of the United States of America, of 2516, View Court, Canton, Ohio, United States of America), do 10 hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

15 This invention relates to suction cleaners of the kind intended to be manoeuvred over the carpet and provided with a rotary dust separator instead of the usual filter bag.

20 Many proposals have hitherto been made to produce a satisfactory cleaner having a rotary dirt-separating member so that when the dirt particles carried by the incoming air make impact with its 25 rapidly moving surfaces, they are deflected and thrown out of the air stream before this air is discharged into the atmosphere. Although such cleaners deal satisfactorily with the heavier 30 dirt particles, they have not proved satisfactory in practice, as the lighter or very minute dust particles pass freely through the separator and consequently are discharged into 35 the atmosphere. To overcome this difficulty proposals have been made to employ a stationary filter for the lighter particles as well as the rotary impact member by which the bulk of the 40 dirt is removed. Such an arrangement presents practical difficulties and experience has shown that the filter soon ceases to perform satisfactorily. The object of the present invention is to provide an 45 improved filter of the bagless type which will overcome the difficulties hitherto experienced.

According to this invention a suction cleaner comprises a chamber having an 50 inlet nozzle and an outlet opening, a suction-creating unit (hereinafter referred to as a fan) by which air is drawn through the nozzle and discharged

through the outlet, and a dirt separator in the chamber, comprising a rotary 55 impact surface portion adapted to remove the dirt particles from the air entering the chamber by contact therewith, and a rotary filtering medium beyond the impact portion by which dirt particles 60 which pass through the impact portion are intercepted. Preferably the separator comprises a rigid frame, which may be of conical shape, forming an impact surface or carrying a layer of relatively coarse wire gauze or the like to form a series of impact surfaces and also supporting a layer of filtering material which extends over the outlet from the chamber. The dirt-separating chamber is preferably 65 arranged between the inlet nozzle and the fan chamber so that the dirt is removed from the fan on the suction side of the fan and the clean air is discharged directly into the atmosphere through the outlet opening in the fan chamber. The rotary dirt separator is conveniently so mounted on an extension of the motor-driven fan shaft that the open base of the rotary separator frame surrounds the fan "eye" in a substantially air-tight manner. Hence all the air drawn in through the nozzle must pass over the impact surface and through the filter material carried by the rotary separator before entering the fan chamber and being discharged through the outlet opening into the atmosphere.

The dirt chamber can be opened when the dirt is to be discharged therefrom, and the dirt separator itself is so constructed that from time to time the filtering medium can be exchanged or removed for cleaning, although it will be appreciated that the rotary movement of the filter tends to dislodge or deposit in the dirt chamber the dust particles which soon clog a stationary filter.

Two constructional forms of apparatus according to this invention are illustrated 100 by way of example in the accompanying drawings, in which

Figure 1 is a sectional side elevation of a suction cleaner having a substantially cylindrical horizontal body terminating in 105 a nozzle,

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Price 7/-

Figure 2 is a cross-section on the line II—II of Figure 1.

Figure 3 shows on a slightly reduced scale a forward end of the cleaner body 5 with a modified form of nozzle.

Figure 4 is a plan of a modified type of suction cleaner in which the motor shaft is arranged parallel to the length of the nozzle, and

10 Figure 5 is a vertical sectional side elevation taken on the line V—V of Figure 4.

The suction cleaner shown in Figures 1—3 is of the horizontal type and comprises a suction nozzle 1 secured to the forward end of a substantially cylindrical casing 2 forming a dirt-collecting chamber. At the rear end of the chamber is a fan chamber 3 having an outlet opening 3a and containing a suction-creating fan 4 driven by a motor in a casing 5 which forms a rear end of the cleaner body. The motor shaft 6 extends beyond the fan chamber into the dirt-collecting chamber 25 and has mounted upon it a rotary dirt-separator hereafter more fully described. The nozzle is mounted upon vertically adjustable wheels 7 and the rear end of the cleaner upon wheels 8, the whole 30 being provided with a handle 9 connected to the casing by a bail 10 so that the cleaner can be manoeuvred over the carpet in the usual manner.

In the construction shown, the nozzle 35 1 is formed integral with the forward end wall 11 of the dirt chamber 2. This enables the dirt thrown off by the separator to accumulate in the lower portion of the casing, and to increase the 40 capacity of the casing, the arrangement illustrated in Figure 3 may be adopted, where the nozzle 1 communicates with the upper portion of the end wall 11a instead of the centre of the nozzle opening being 45 in alignment with the motor shaft as in Figure 1. In both cases suitable latch members 12 are employed to secure the end wall to the cylindrical casing 2. At its rear end similar latch members 13 connect the casing 2 to the fan chamber 3.

The forward end of the extended motor shaft 6 is supported in a suitably protected bearing 14 mounted in a spider 15 formed within the forward end of the 55 casing. The rotary dirt-separating member is mounted on the motor shaft 6 and comprises a truncated conical rigid frame 16 having its smaller end keyed to the shaft in any suitable manner and its 60 base or larger end substantially flush with the front wall of the fan chamber 3, this base having projecting flanges 17 to engage corresponding grooves 3b in the front wall of the fan surrounding the fan 65 "eye". Surrounding the frame 16 of

the dirt-separating member are two superimposed layers, the inner one 17a of which is preferably of fine or closely woven or felted filtering material such as cloth, whereas the outer layer 18 is of relatively coarse wire mesh. These layers fit over the frame 16 and are held in position by any suitable retaining members which enable the layers to be removed or replaced from time to time. In the particular example shown the narrow end of the separator has a retaining member in the form of a flanged collar 19, a flat band or strap 20 surrounding the centre of the frame and a removable ring 21 at 70 its base.

In operation, the suction created by the fan 4 rotating at high speed draws the dust-laden air through the nozzle 1 and thence into the dust chamber 2 so that a longitudinal stream of air flows towards the fan eye. Interposed in the path of the dirt particles carried by the air, is the rotary conical separator, presenting a number of impact surfaces throughout the 80 area of the outer layer of coarse wire mesh. Hence the dirt particles which strike these impact surfaces are thereby deflected and thrown outwardly to collect at the bottom of the casing 2, as shown in Figures 1 and 3, whilst the air continues its course through the separating member into the fan chamber.

This so-called impact separation of the dirt particles does not however remove 100 the very fine particles which, without a filter, would be carried with the air into the fan chamber and thence discharged into the atmosphere through the outlet opening 3a. To overcome this difficulty, 105 the filter of fine woven or felted material 17a underlying the coarse screen 18 intercepts any particles which are not separated out and the rotary motion will tend to throw such dirt particles outwards 110 and so maintain the filter in a relatively clean condition. The combined impact separator screen and filter prevents the passage of dirt into the enclosed space within the rotary separator in front of the 115 fan eye and hence from entering the fan chamber and from being discharged into the atmosphere through the outlet 3a.

In the alternative construction illustrated in Figures 4 and 5, the suction 120 nozzle 22 contains a rotary agitator 23 of any known type, the length of which is arranged parallel to the motor shaft 24 from which it is driven by means of a belt 25. The motor casing 26 is secured 125 to the fan chamber 27 and, as before, the motor shaft not only carries the fan 28 but is extended into a substantially cylindrical chamber 29 where its forward end is supported in a suitable bearing 30. 130

The rotary dirt separator, indicated generally by the reference numeral 31, does not differ essentially from that already described.

- 5 The dirt chamber 29 forms a liner which fits into a cylindrical housing 32, suitable locking members 33 being provided which are released when the casing 29 is to be removed for emptying the dirt.  
 10 The operation of the cleaner illustrated in Figures 4 and 5 is similar to that already described, except that the dirt-laden air enters the dust-collecting chamber 29 through the opening 34 at right angles to the axis of rotation and in a direction approximately tangential with respect to the surface of the rotary separator, and clean air is discharged into the atmosphere through the outlet opening 35 in the fan chamber.  
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It will be appreciated that the constructional details may vary considerably and that although a separator having an impact surface of coarse wire gauze and 25 a filtering layer of fabric or felted material has been described, many modified forms of construction may be employed without departing from the invention.

30 Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

35 1. In a suction cleaner, the combination with a chamber having an inlet nozzle and an outlet opening, of a fan by which air is drawn in through the nozzle and discharged through the outlet, and a dirt 40 separator in the chamber comprising a rotary impact surface portion adapted to remove the dirt particles from the air entering the chamber by contact therewith, and a rotary filtering medium 45 beyond the impact portion by which dirt particles which pass through the impact portion are intercepted.

2. A suction cleaner as claimed in Claim 1, in which the rotary dirt separator comprises a rigid open-work frame forming an impact surface, and supporting a layer of filter material extending over the outlet from the chamber.

3. A suction cleaner as claimed in Claim 1 or Claim 2, in which the dirt-separating chamber is arranged between the inlet nozzle and the fan chamber so that the dirt is removed from the air on the suction side of the fan and the clean

air is discharged directly into the atmosphere.

4. In a suction cleaner, the combination with an inlet nozzle, of a dirt-collecting chamber communicating therewith, a fan chamber containing a motor-driven 65 fan communicating with the dirt chamber and having a discharge opening to the atmosphere, and a rotary dust separator also driven by the fan motor comprising superimposed layers of relatively coarse 70 and fine filtering materials arranged to enclose a space immediately adjacent to the opening to the fan chamber.

5. A suction cleaner as claimed in any of the preceding claims, in which the 75 rotary dirt separator comprises a substantially conical frame having an opening at one end sealing the outlet opening of the dirt chamber, and carrying an outer layer of relatively coarse wire mesh 80 or the like constituting an impact surface and an inner layer of relatively fine filtering material.

6. A suction cleaner as claimed in any of the preceding claims, in which the 85 motor shaft extends beyond the fan chamber into the dirt chamber and carries the rotary dirt separator.

7. A suction cleaner as claimed in any of the preceding claims in which the dirt-separating chamber can be opened or removed when the accumulated dirt is to be emptied therefrom.

8. A suction cleaner as claimed in Claim 3, Claim 4, Claim 5 or Claim 6, in 95 which the dirt separator is mounted on the motor shaft and comprises a substantially conical frame having an open base which surrounds the fan eye in a substantially air-tight manner, this frame 100 carrying superimposed layers of relatively coarse wire mesh and fine filtering material which can be removed or replaced when required.

9. The combination and arrangement of 105 parts constituting the complete rotary separator and filter for suction cleaners as described or as shown in Figures 1 and 2 or in Figures 4 and 5 of the accompanying drawings.

10. The combination and arrangement of parts constituting the complete suction cleaner as described or as shown in Figures 1-3 or in Figures 4 and 5 of the accompanying drawings.

Dated this 6th day of August, 1936.

KILBURN & STRODE,

Agents for the Applicants.

*(This Drawing is a reproduction of the Original on a reduced scale!)*

Fig. 1.

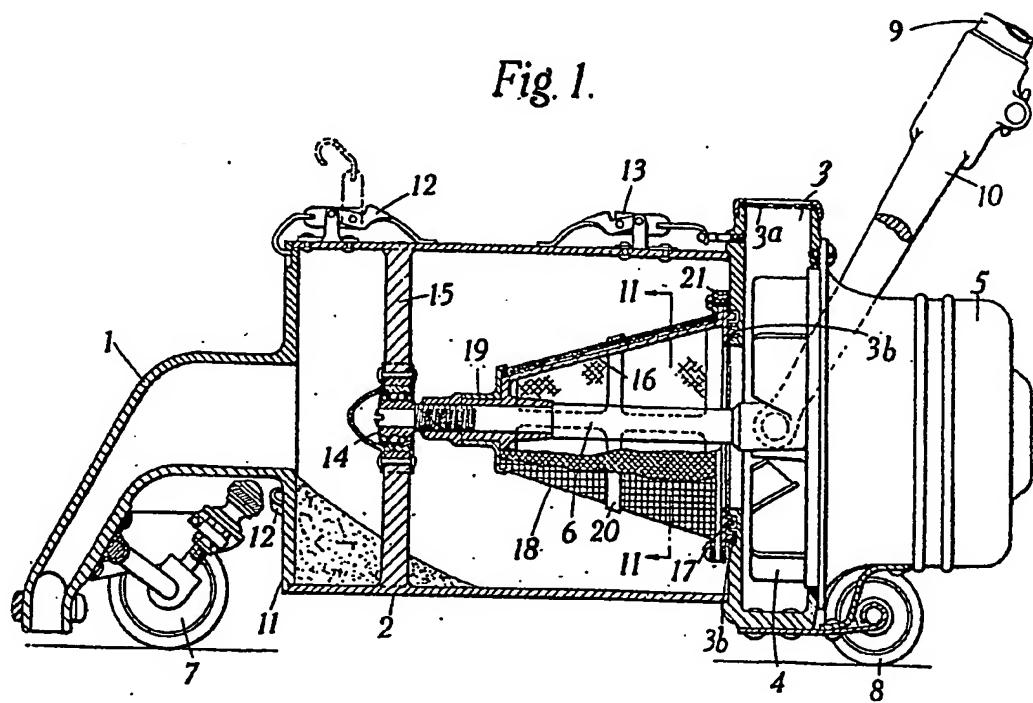


Fig. 3.

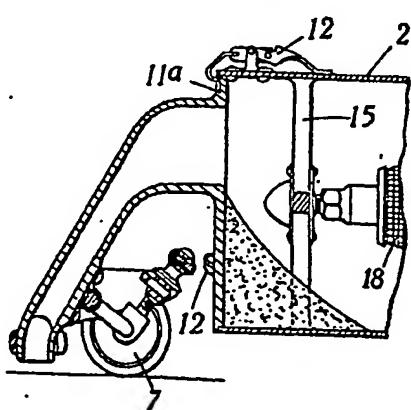
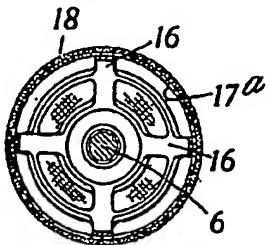


Fig. 2.



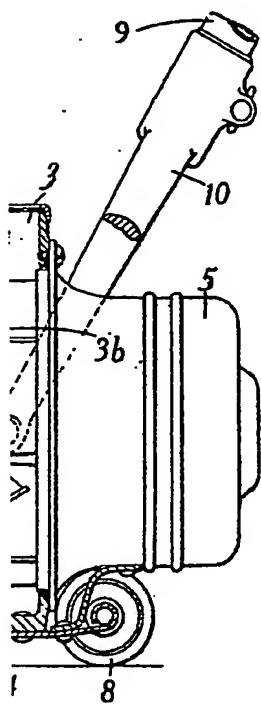


Fig. 4.

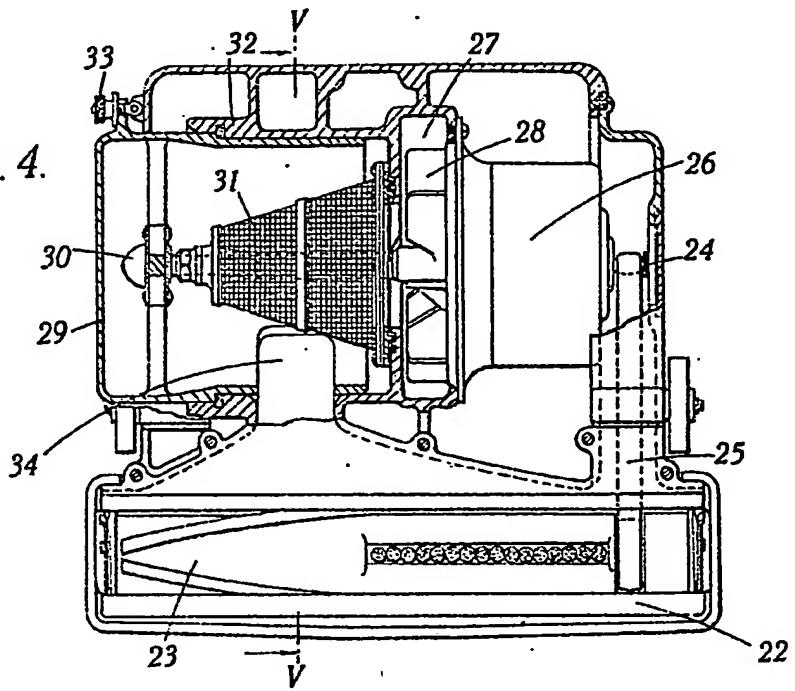
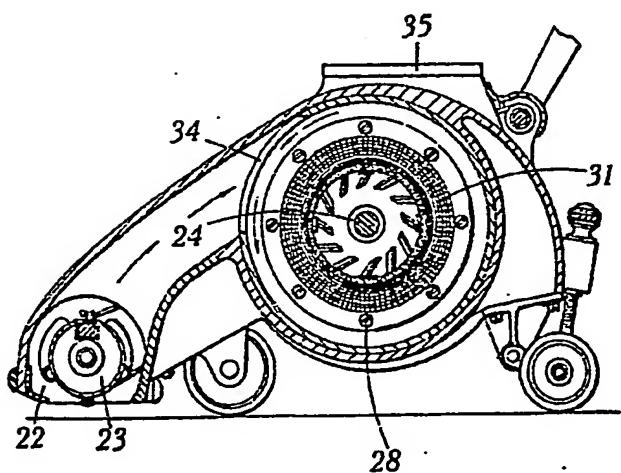
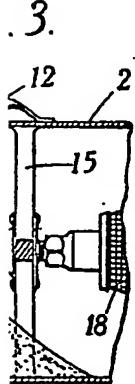


Fig. 5.



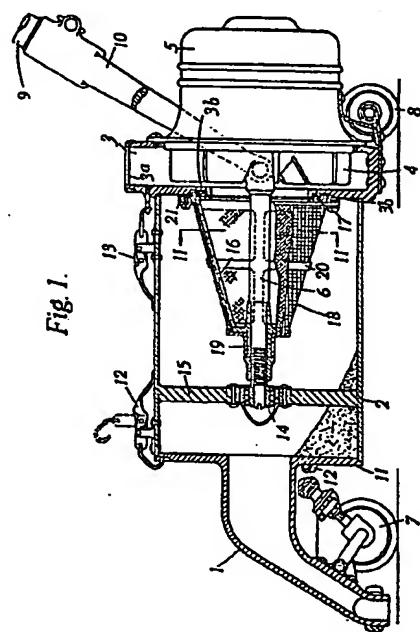


Fig. 1.

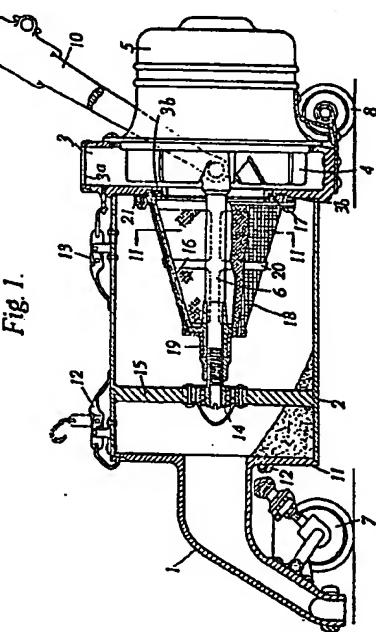


Fig. 2.

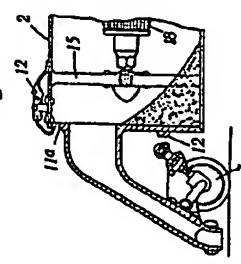


Fig. 3.

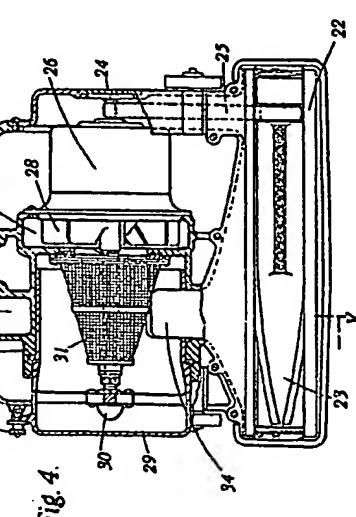


Fig. 4.

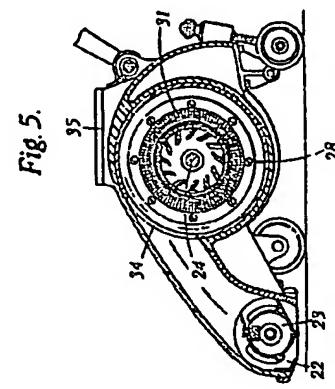


Fig. 5.